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(54) **Thin IC card and method for producing the same**

Dünne Chipkarte und ihr Herstellungsverfahren

Carte à puce mince et méthode de sa fabrication

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- **PATENT ABSTRACTS OF JAPAN vol. 013 no. 475 (P-950) ,27 October 1989 & JP-A-01 185783 (MITSUBISHI ELECTRIC CORP) 25 July 1989,**

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Description

[0001] This invention relates to a thin IC card and a method for producing a thin IC card.

[0002] Conventionally known storage means for recording or storing various data include, for example, contact type microcomputer cards having a built-in CPU and non-contact type wireless cards which use an electric wave to send and receive information. These cards are generally called the IC card, have advantages and superiority in practical uses, and are practically used broadly in the form utilizing their advantages and superiority. In view of the inconvenience in using these cards properly depending on where they are used, composite IC cards which have the advantages and superiority of the contact type and non-contact type IC cards have been developed (e.g. Japanese Patent Publication No. 4-16831). Specifically, such IC cards have (a) the advantages of the contact type IC card which processes inputs from an external device connected via electrical contacts by a semiconductor chip (IC chip) having the functions of a memory or CPU built in the IC card, takes out the processed inputs as a new signal, and automatically checks the signal, and (b) the advantages of the non-contact type IC card in which an electromagnetic field formed by an external device is received by an antenna and rectified or detected to obtain a signal, information previously stored is called by this signal, and the required processing of information is conducted without complexity and contacting.

[0003] In the above composite IC cards, the CPU having the memory function relating to main information processing is fixed, so that the capacity and functions of the composite IC cards are limited. Therefore, it is necessary to always maintain or having a built-in semiconductor chip as the function element for each use. In other words, it is always necessary to keep or carry a plurality of composite IC cards having dimensions (85.6mm long, 54.0mm wide, 0.76mm thick) according to the standard of JEIDA (Japanese Electronic Industry Development Association), and partically is limited in view of carrying and space because plural composite IC cards have to be always kept or carried.

[0004] DE A 41 05 869 discloses an IC card with an IC element on a support film. The support film comprising contacts and antennas for contact and non-contact communication. The IC element is not freely detachable from the support film. EP A 0 231 3 discloses a printed wiring board for IC cards. There is no antenna for receiving the signal without contacting.

[0005] DE 42 18 923 discloses an IC card with a detachable chip.

[0006] It is object of this invention is to provide a highly reliable thin IC card and a method for producing it.

[0007] And, another object of this invention is to provide a thin IC card having a simple structure and construction and a method for producing it.

[0008] Further, another object of this invention is to provide a thin IC card having remarkably improved portability and a method for producing it.

[0009] In a first aspect, the present invention provides an IC card having both functions of contact and non-contacting card, the card comprises:

a plate type IC module in which a semiconductor chip having at least one memory function and CPU function is disposed on one side of a through-hole board,
the semiconductor chip being one-side sealed with a resin, external connecting terminals to be connected to input/output terminals of the semiconductor chip being flatly led and exposed to another side of the through-hole board; and
a card-like support which is capable of forming the IC card with the plate type IC module, the card-like support comprising a fitting section for detachably fitting the plate type IC module, a required circuit wiring, and an antenna for sending and receiving a signal without contacting,
the fitting section having connecting terminals arranged therein for electrically connecting the required circuit wiring to the external connecting terminals,
wherein the card-like support has a circumferential area and an inside area surrounded by the circumferential area, the fitting section being formed in the inside area, and the antenna being formed in the circumferential area to surround the inside area for sending and receiving a signal without contacting.

[0010] If necessary the present invention may further comprise an oscillator for specifying a frequency and a power supply battery.

[0011] In a second aspect, the present invention provides a method for producing an IC card the method comprises the following:

a step of forming a card-like wiring board including a required circuit wiring and an antenna for sending and receiving a signal without contacting,
a step of forming a card-like support by providing a structure to fit or include a plate type IC module into a predetermined area of the card-like wiring board, to define a fitting section for the IC module, the fitting section having connecting terminals arranged therein which are electrically connected to the circuit wiring,
the plate type IC module having a semiconductor chip with at least one memory function and CPU function disposed on one side of a through-hole board, the semiconductor chip being one-side sealed with a resin external connecting terminals to be connected to input/output terminals of the semiconductor chip being flatly led and exposed to another side of the through-hole board,
and a step of fitting or arranging the plate type IC

module detachably in the fitting section of the card-like support with the surface of externally connecting terminals of the plate type IC module exposed to be substantially flush with the surface of the card-like support, and electrically connecting the external terminals of the IC module to the connecting terminals of the fitting section

[0012] If necessary, the method may further comprise a step of electrically connecting the oscillator and the power supply battery, which are fitted, included or arranged in the predetermined areas of the card-like support by the predetermined circuit wiring within the card-like support.

[0013] This invention may omit the power supply battery when electric power is generated by providing an IC chip with a function for oscillating a frequency, or by an electromagnetic induction method which uses the antenna provided in the card-like support and appropriately applies a high frequency having a changed wavelegth to the antenna. And, if it is necessary in view of the function, and oscillator for specifying a frequency and a power supply battery may be separately fitted or provided.

Fig. 1 is a perspective view seeing through a structural example of the essential part of the thin IC card according to this invention.

Fig. 2 is a sectional view taken along line A-A of Fig. 1.

Fig. 3 is a front perspective view showing a structural example of the essential part of a plate type IC module provided in the thin IC card according to this invention.

Fig. 4 is a back perspective view showing a structural example of the essential part of the plate type IC module of Fig. 3.

Fig. 5 is a sectional view of the essential part taken along line B-B of Fig. 3.

Fig. 6 is a sectional view showing another structural example of the essential part of the thin IC card according to this invention.

Fig. 7 is a perspective view exploded showing still another structural example of the essential part of the thin IC card according to this invention.

Fig. 8 is a perspective view seeing through another structural example of the essential part of the thin IC card according to this invention.

[0014] The IC card according to this invention is a so-called composite IC card. Specifically, this IC card has both advantages and superiority of contact and non-contact type IC cards, and adopts a structure capable of easily fitting an only function section which relates to main information processing. More specifically, this IC card has one element which is a plate type IC module in which a semiconductor chip having at least memory function and CPU function is sealed on its one side with a resin, and externally connecting terminals to be connected to the input/output terminals of the semiconductor chip are flatly led and exposed to a non-resin sealed or molded side. And, the plate type IC module is structured to be able to be optionally attached to or removed from a card-like support which includes therein a required circuit wiring, an antenna for sending and receiving a signal without contacting, and if necessary an oscillator for specifying a frequency and a power supply battery. In other words, the card-like support is provided with versatility, so that the plate type IC module can be removed and changed to easily meet various applications.

[0015] Embodiments of this invention will be described with reference to Fig. 1 through Fig. 8.

Embodiment 1

[0016] Fig. 1 is a perspective view seeing through a rough structural embodiment of the IC card according to this invention. And Fig. 2 is a sectional view taken along line A-A of Fig. 1. In Fig. 1 and Fig 2, reference numeral 1 is a plate type IC module. The plate type IC module 1 includes a semiconductor chip (IC chip) having at least memory and CPU functions and having its one side sealed or molded with a resin, and flat type externally connecting terminals 1a which have their one end connected to the input/output terminals of the semiconductor chip and the other end led and exposed to a non-resin sealed or molded side. Reference numeral 2 is a card-like support which is configured such that the plate type IC module 1 can be fitted easily. More specifically, the card-like support 2 includes therein a required circuit wiring, an antenna 2a for sending and receiving a signal without contacting and a power supply battery 2b, and has a fitting section for fitting the plate type IC module 1 with the side of its externally connecting terminals 1a exposed to be substantially flush with the surface of the card.

[0017] In further detail, the plate type IC module 1 is structured as shown in Fig. 3 which perspectively shows one side sealed or molded with a resin, Fig. 4 which perspectively shows the other side (reverse side) not sealed or molded with a resin, and Fig. 5 which shows a cross section taken along line B-B of Fig. 3. For example, a CPU 1b including a nonvolatile semiconductor memory is placed on the surface of a so-called through-hole resin type wiring board 1c by a wire bonding 1d. The through-hole wiring board 1c has dimensions of, for example, approximately 14.0mm long, 13.0mm wide, and 0.3mm thick. The CPU 1b may include a static electricity resistant element for input/output and for preventing electrostatic breakdown, if necessary.

[0018] The wiring board 1c having on its one side the CPU 1b including a nonvolatile semiconductor memory mounted, is sealed or molded with, for example, a transfer mold layer 1e to form the thin plate type IC module 1 which is packaged to have a total thickness of about

0.6mm (formed into a package). For making this structure, flip chip bonding, which directly applies the reverse side of the CPU 1b to the surface of the wiring board 1c, may be used instead of the wire bonding 1d. In this case, the packaged thin plate type IC module 1 may have a structure in that its one side having the CPU 1b is not entirely sealed or molded with the resin layer 1e but partly coated or sealed to fill a space between the IC chip 1b and the wiring board 1c as shown in the sectional view of Fig. 6. The through-hole wiring board 1c whose one side is sealed, or the back side (non-resin sealed or molded side) of the plate type IC module 1 has the flat (flat type) terminals 1a which are led through the through holes. And, the flat terminals 1a have their surface plated with gold (Au) and, when they are used in a contact type, they functions as externally connecting terminals to electrically connect with the contacts of external equipment (read/writer).

[0019] On the other hand, the card-like support 2 has dimensions (85.6mm long, 54.0mm wide, and 0.76mm thick) according to the standard of, for example, JEIDA, and is provided with a fitting section for fitting or mounting at least the plate type IC module 1 with the surface of the externally connecting terminals 1a of the plate type IC module 1 exposed to be flush with the surface of the card-like support 2. Further, the card-like support 2 has the antenna 2a for sending and receiving a signal without contacting and the power supply battery 2b built in (internally disposed), embedded, fitted or mounted, and also has a wiring circuit, which electrically connects the aforementioned fitted or mounted respective parts to cause the required functions of the card to operate, built in or embedded. And, the wiring circuit is internally arranged in the card-like support 2 in the form of a single layer or multiple layers, and the antenna 2a for sending and receiving a signal without contacting is generally arranged internally in the circumferential area within the card-like support 2. In the structure of the card-like support 2, when the plate type IC module 1 is fitted or mounted in the fitting section of the card-like support 2, the plate type IC module 1 can be electrically connected to the connection terminals of the internally arranged wiring circuit.

[0020] In this embodiment, the power supply battery 2b which is built in, embedded, fitted or mounted to the card-like support 2 may be a secondary battery, which can be externally charged through the externally connecting terminals 1a of the plate type IC module 1.

[0021] Examples of producing or fabricating the above thin film IC card will be described.

[0022] First, the card-like wiring board, which has the required circuit wiring and the antenna 2a for sending and receiving a signal without contacting therein, is formed. This card-like wiring board is produced by a conventional technology for producing printed wiring boards, such as photo-etching, lithography, and laminating technologies. Then, the card-like support 2 is produced by disposing a structure to fit or build-in the plate type IC module 1 and the power supply battery 2b in prescribed areas of the formed card-like wiring board. In this case, the power supply battery 2b may be previously embedded in the previous process of forming the card-like wiring board.

[0023] Then, the plate type IC module 1 is fitted and arranged in the fitting section for the plate type IC module, which is formed in a prescribed area of the card-like support 2, with the surface of the externally connecting terminals 1a of the plate type IC module 1 exposed to be substantially flush with the surface of the card. When the plate type IC module 1 is fitted to the card-like support 2, it is electrically connected to the connecting terminals which are previously arranged in the fitting section for the plate type IC module. Then, the power supply battery 2b and the like are built in or arranged in prescribed areas in the card-like support 2 and electrically connected to the prescribed circuit wiring, thereby completing the assembling and the production of a desired thin film IC card. In the production of the card-like wiring board (or the card-like support 2), the wiring board body having the required circuit wiring may be formed previously, and several resin film layers may be applied to either side of the wiring board body. For example, as shown in the perspective view of Fig. 7, there may be employed a structure to position and apply an insulating thin plate 3 having a thickness of about 0.3mm which has a window 3a to expose and fit the flat type externally connecting terminals 1a of the plate type IC module 1 and a recessed fitting section for the power supply battery 2b, a card-like circuit board body 3' having a thickness of about 0.3mm which has open fitting sections for the IC module 1 and the power supply battery 2b and the built-in antenna 2a electrically connected to the circuit wiring, and an insulating thin plate 3" having a thickness of about 0.16mm to one another into three layers.

[0024] And, although the above structure includes the power supply battery 2b, the provision or attachment of the power supply battery 2b may be omitted. Specifically, to the antenna 2a for sending and receiving a signal without contacting, which is provided or built in the card-like support 2, an electric wave whose wavelength is changed is applied at timing different from the signal to generate electric power by electromagnetic induction. Thus, the required functions can be given to the non-contact type IC card even when the power supply battery 2b is omitted.

Embodiment 2

[0025] Fig. 8 is a perspective view seeing through another rough structural embodiment of the thin IC card according to this invention, in which reference numeral 1 is a plate type IC module. This plate type IC module 1 includes a semiconductor chip (IC chip) having at least memory and CPU functions and having its one side sealed or molded with a resin, and flat type externally

connecting terminals 1a which have their one end connected to the input/output terminals of the semiconductor chip and the other end led and exposed to a non-resin sealed or molded side. Reference numeral 2 is a card-like support which is configured such that the plate type IC module 1 can be attached or removed freely. More specifically, the card-like support 2 includes therein a required circuit wiring (not shown), an antenna 2a for sending and receiving a signal without contacting, an oscillator 2c for specifying a frequency and a power supply battery 2b, and has a fitting section for fitting the plate type IC module 1 therein with the surface of the externally connecting terminals 1a exposed to be substantially flush with the surface of the card.

[0026] In further detail, the plate type IC module 1 has the same structure as in Embodiment 1. That is, it is structured as shown in Fig. 3 which perspectively shows one side sealed or molded with a resin, Fig. 4 which perspectively shows the other side (reverse side) not sealed or molded with a resin, and Fig. 5 which shows a cross section. For example, a CPU 1b including a nonvolatile semiconductor memory is placed on the surface of so-called through-hole resin type wiring board 1c by a wire bonding 1d. The through-hole wiring board 1c has dimensions of, for example, approximately 14.0mm long, 13.0mm wide, and 0.30mm thick. The CPU 1b may include a static electricity resistant element for input/output and for preventing electrostatic breakdown, if necessary. And, the wiring board 1c on which the CPU 1b including a nonvolatile semiconductor memory is mounted has its one side sealed or molded with, for example, a transfer mold layer 1e to form the thin plate type IC module 1 which is packaged to have a total thickness of about 0.6mm. For making this structure, flip chip bonding, which directly applies the reverse side of the CPU 1b to the surface of the wiring board 1c, may be used instead of the wire bonding 1d. In this case, the packaged thin plate type IC module 1 may have a structure that its one side having the IC chip 1b is not entirely sealed or molded with a resin but partly coated or sealed to fill a space between the IC chip 1b and the wiring board 1c as shown in Fig. 6.

[0027] The through-hole wiring board 1c whose one side is sealed, or the back side (non-resin sealed or molded side) of the plate type IC module 1 has the flat (flat type) terminals 1a, which are led through the through holes, arranged to form a package. And, the flat terminals 1a have their surface plated with gold (Au) and, when they are used in a contact type, they function as externally connecting terminals to electrically connect with the contacts of external equipment (read/writer).

[0028] On the other hand, the card-like support 2 has dimensions (85.6mm long, 54.0mm wide, and 0.76mm thick) according to the standard of, for example, JEIDA, and is provided with a fitting section for fitting or mounting at least the plate type IC module 1 with the surface of the externally connecting terminals 1a of the plate type IC module 1 exposed to be flush with the surface of the card-like support 2. Further, the card-like support 2 has the antenna 2a for sending and receiving a signal without contacting, the oscillator 2c for specifying a frequency and the power supply battery 2b built in, embedded, fitted or mounted, and also has a wiring circuit, which electrically connects the aforementioned fitted or mounted respective parts to cause the required functions of the card to operate, built in or embedded. And, the wiring circuit is internally arranged in the card-like support 2 in the form of a single layer or multiple layers, and the antenna 2a for sending and receiving a signal without contacting is generally arranged internally in the circumferential area within the card-like support 2. In this structure, when the plate type IC module 1 is fitted or mounted in the fitting section of the card-like support 2, the externally connecting terminals of the plate type IC module 1 are electrically connected to the connection terminals of the internally arranged wiring circuit.

[0029] In this embodiment, the power supply battery 2b which is built in, embedded, fitted or mounted to the card-like support 2 may be a secondary battery which can be externally charged through the externally connecting terminals 1a of the plate type IC module 1.

[0030] Examples of producing or fabricating the above thin film IC card will be described.

[0031] First, the card-like wiring board having the required circuit wiring and the antenna for sending and receiving a signal without contacting therein is formed. This card-like wiring board is produced by a conventional technology for producing printed wiring boards, such as photo-etching, lithography, and laminating technologies. Then, the card-like support 2 is produced by disposing a structure to fit or build-in the plate type IC module 1, the oscillator 2c for specifying a frequency and the power supply battery 2b in prescribed areas of the formed card-like wiring board. In this case, the oscillator for specifying a frequency and the power supply battery 2b may be previously embedded in the previous process of forming the card-like wiring board.

[0032] Then, the plate type IC module 1 is fitted and arranged in the fitting section for the plate type IC module, which is formed in a prescribed area of the card-like support 2, with the surface of the externally connecting terminals 1a of the plate type IC module exposed to be substantially flush with the surface of the card. Thus, the plate type IC module 1 is electrically connected to the connecting terminals which are previously arranged in the fitting section for the plate type IC module, and connected to the circuit wiring of the card-like support 2. Then, the oscillator 2c and the power supply battery 2b are built in or arranged in prescribed ares in the card-like support 2 and electrically connected to the prescribed circuit wiring, thereby completing the assembling and the production of a desired thin film IC card.

[0033] As obvious from the above description, this thin IC card has both functions of the contact and non-contact cards. And, in the structure of the thin film IC card

according to this invention, the semiconductor device section having memory and CPU functions, mainly contributing (relating) to the functions of the card, is formed into a flat module piece, and this flat module piece can be easily attached to or removed from the card-like support. More specifically, this thin film IC card having multiple functions can be used for example as a bank card, a wireless card which saves a certain amount of money withdrawn form the bank and pays various charges like a prepaid card, or used as a commuter pass and an ID card by devising software.

Claims

1. An IC card having both functions of contact and non-contacting card, the card comprises:

   a plate type IC module (1) in which a semiconductor chip (1b) having at least one memory function and CPU function is disposed on one side of a through-hole board (1c), the semiconductor chip (1b) being one-side sealed with a resin (1e), external connecting terminals (1a) to be connected to input/output terminals of the semiconductor chip (1b) being flatly led and exposed to another side of the through-hole board (1c); and
   a card-like support (2) which is capable of forming the IC card with the plate type IC module (1), the card-like support (2) comprising a fitting section for detachably fitting the plate type IC module (1), a required circuit wiring, and an antenna (2a) for sending and receiving a signal without contacting,
   the fitting section having connecting terminals arranged therein for electrically connecting the required circuit wiring to the external connecting terminals (1a),
   wherein the card-like support (2) has a circumferential area and an inside area surrounded by the circumferential area, the fitting section being formed in the inside area, and the antenna (2a) being formed in the circumferential area to surround the inside area for sending and receiving a signal without contacting.

2. An IC card according to claim 1, further comprising a means which applies to said antenna an electric wave having a different wave length at timing different from the signal to generate electric power for operating by electromagnetic induction.

3. An IC card according claim 1 or 2, further comprising a power supply battery (2b) provided in the card-like support (2).

4. An IC card according to claim 1 or 2, further comprising an oscillator (2c) for specifying a frequency and an electric power battery (2b), the oscillator (2c) and the electric power battery (2b) being provided in the inside area of the card-like support (2).

5. An IC card according to any one of claims 1 to 4, wherein said semiconductor chip has a function to oscillate a required frequency.

6. An IC card according to any one of claims 1 to 5, wherein the wiring board of said plate type IC module (1) is a resin based wiring board.

7. An IC card according to any one of claims 1 to 6, wherein said IC card has a thickness of 0.76mm.

8. An IC card according to claim 1, further comprising an oscillator (2c) for specifying a frequency, and a rechargeable secondary battery (2b), the oscillator (2c) and the rechargeable secondary battery (2b) being provided in the card-like support (2).

9. An IC card according to any one of claims 1 to 8, wherein the card-like support (2) has a laminated structure, the laminated structure comprising:

   a first insulating thin plate (3) having a window (3a) to expose and fit the side of the flat type externally connecting terminals (1a) of the plate type IC module (1) and a recessed fitting section for a power supply battery (2b),
   a circuit board body (3') having open fitting sections for the plate type IC module (1) and the power supply battery (2b), being applied to the first insulating thin plate (3), and including the antenna (2a) built in the circumferential portion of the circuit board body (3') and electrically connected to a circuit wiring in the circuit board body (3'), and
   a second insulating thin plate (3") which is applied to the other side of said circuit board body (3').

10. An IC card according to claim 9, wherein said first insulating thin plate (3), said circuit board body (3') and said second insulating thin plate (3") have a thickness of about 0.3mm, about 0.3mm and about 0.16mm, respectively.

11. A method for producing an IC card the method comprises the following:

    a step of forming a card-like wiring board (3') including a required circuit wiring and an antenna (2a) for sending and receiving a signal without contacting,
    a step of forming a card-like support (2) by providing a structure to fit or include a plate type IC module (1) into a predetermined area of the

card-like wiring board (3'), to define a fitting section (3a) for the IC module (1), the fitting section having connecting terminals arranged therein which are electrically connected to the circuit wiring,

the plate type IC module having a semiconductor-chip (1b) with at least one memory function and CPU function disposed on one side of a through-hole board (1c) the semiconductor chip (1b) being one-side sealed with a resin (1e), external connecting terminals (1a) to be connected to input/output terminals of the semiconductor chip (1b) being flatly led and exposed to another side of the through-hole board (1c),

and a step of fitting or arranging the plate type IC module (1) detachably in the fitting section of the card-like support (2) with the surface of externally connecting terminals (1a) of the plate type IC module (1) exposed to be substantially flush with the surface of the card-like support (2), and electrically connecting the external terminals (1a) of the IC module (1) to the connecting terminals of the fitting section (3a).

12. A method according to claim 11, wherein the step of forming the card-like support (2) by providing the structure to fit or include the plate type IC module (1) further comprises to fit or include an oscillator (2c) for specifying a frequency and a power supply battery (2b) into the predetermined areas of the card-like wiring board (3'), and the method further comprising a step of including and arranging the plate type IC module (1), the oscillator (2c) and the power supply battery (2b) in the predetermined areas of the card-like support (2), and electrically connecting by the predetermined circuit wiring within the card-like support (2).

Patentansprüche

1. Chipkarte mit Funktionen sowohl einer Kontaktkarte als auch einer kontaktlosen Karte, wobei die Karte aufweist:

einen plattenartigen IC-Baustein (1), in dem ein Halbleiterchip (1b) mit mindestens einer Speicherfunktion und einer CPU-Funktion auf einer Seite einer Leiterplatte mit Durchkontaktmontage (1c) angeordnet ist, wobei der Halbleiterchip (1b) auf einer Seite mit einem Harz (1e) versiegelt ist, wobei externe Verbindungsanschlüsse (1a), die mit Eingangs-/Ausgangsanschlüssen des Halbleiterchips (1b) zu verbinden sind, flach geführt werden und auf einer anderen Seite der Leiterplatte mit Durchkontaktmontage (1c) freiliegen; und

einen kartenartigen Träger (2), der die Chipkarte mit dem plattenartigen IC-Baustein (1) bilden kann, wobei der kartenartige Träger (2) einen Bestückungsabschnitt zum lösbaren Einsetzen des plattenartigen IC-Bausteins (1), eine erforderliche Schaltkreisverdrahtung und eine Antenne (2a) zum kontaktlosen Senden und Empfangen eines Signals aufweist,

wobei der Bestückungsabschnitt Verbindungsanschlüsse aufweist, die darin für den elektrischen Anschluß der erforderlichen Schaltkreisverdrahtung an die äußeren Verbindungsanschlüsse (1a) angeordnet sind,

wobei der kartenartige Träger (2) einen peripheren Bereich und einen von dem peripheren Bereich umgebenen Innenbereich aufweist, wobei der Bestückungsabschnitt in dem Innenbereich ausgebildet ist und die Antenne (2a) zum kontaktlosen Senden und Empfangen eines Signals in dem peripheren Bereich ausgebildet ist, so daß sie den Innenbereich umgibt.

2. Chipkarte nach Anspruch 1, die ferner eine Einrichtung aufweist, die mit einer vom Signal verschiedenen Zeitsteuerung an die Antenne eine elektrische Welle von verschiedener Wellenlänge anlegt, um durch elektromagnetische Induktion elektrische Energie für den Betrieb zu erzeugen.

3. Chipkarte nach Anspruch 1 oder 2, die ferner eine in dem kartenartigen Träger (2) untergebrachte Stromversorgungsbatterie (2b) aufweist.

4. Chipkarte nach Anspruch 1 oder 2, die ferner einen Oszillator (2c) zur Vorgabe einer Frequenz sowie eine Stromversorgungsbatterie (2b) aufweist, wobei der Oszillator (2c) und die Stromversorgungsbatterie (2b) im Innenbereich des kartenartigen Trägers (2) untergebracht sind.

5. Chipkarte nach einem der Ansprüche 1 bis 4, wobei der Halbleiterchip eine Funktion hat, eine Schwingung mit einer erforderlichen Frequenz zu erzeugen.

6. Chipkarte nach einem der Ansprüche 1 bis 5, wobei die Leiterplatte des plattenartigen IC-Bausteins (1) eine Leiterplatte auf Harzbasis ist.

7. Chipkarte nach einem der Ansprüche 1 bis 6, wobei die Chipkarte eine Dicke von 0,76 mm hat.

8. Chipkarte nach Anspruch 1, die ferner einen Oszillator (2c) zur Vorgabe einer Frequenz und eine wiederaufladbare Sekundärbatterie (2b) aufweist, wobei der Oszillator (2c) und die wiederaufladbare Sekundärbatterie (2b) in dem kartenartigen Träger

(2) untergebracht sind.

9. Chipkarte nach einem der Ansprüche 1 bis 8, wobei der kartenartige Träger (2) eine Schichtstruktur hat, wobei die Schichtstruktur aufweist:

eine erste dünne Isolierplatte (3) mit einem Fenster (3a) zum Freilegen und Bestücken der Seite mit den flachen äußeren Verbindungsanschlüssen (1a) des plattenartigen IC-Bausteins (1) und mit einem ausgesparten Bestückungsabschnitt für eine Stromversorgungsbatterie (2b),
einen Leiterplattenkörper (3') mit offenen Bestückungsabschnitten für den plattenartigen IC-Baustein (1) und die Stromversorgungsbatterie (2b), der auf die erste dünne Isolierplatte (3) aufgebracht ist und die Antenne (2a) einschließt, die in dem peripheren Abschnitt des Leiterplattenkörpers (3') eingebaut und elektrisch mit einer Schaltkreisverdrahtung in dem Leiterplattenkörper (3') verbunden ist, und
eine zweite dünne Isolierplatte (3"), die auf die andere Seite des Leiterplattenkörpers (3') aufgebracht ist.

10. Chipkarte nach Anspruch 9, wobei die erste dünne Isolierplatte (3), der Leiterplattenkörper (3') und die zweite dünne Isolierplatte (3") eine Dicke von etwa 0,3 mm, etwa 0,3 mm bzw. etwa 0,16 mm haben.

11. Verfahren zur Herstellung einer Chipkarte, wobei das Verfahren die folgenden Schritte aufweist:

einen Schritt zum Ausbilden einer kartenartigen Leiterplatte (3'), die eine erforderliche Schaltkreisverdrahtung und eine Antenne (2a) zum kontaktlosen Senden und Empfangen eines Signals einschließt,
einen Schritt zum Ausbilden eines kartenartigen Trägers (2) durch Bereitstellen einer Struktur zum Einsetzen oder Einbau eines plattenartigen IC-Bausteins (1) in einen vorgegebenen Bereich der kartenartigen Leiterplatte (3'), um einen Bestückungsabschnitt (3a) für den IC-Baustein (1) zu definieren, wobei der Bestückungsabschnitt darin angeordnete Verbindungsanschlüsse aufweist, die elektrisch mit der Schaltkreisverdrahtung verbunden sind,
wobei der plattenartige IC-Baustein einen Halbleiterchip (1b) mit mindestens einer Speicherfunktion und einer CPU-Funktion aufweist, der auf einer Seite einer Leiterplatte mit Durchkontaktmontage (1c) angeordnet ist, wobei der Halbleiterchip (1b) auf einer Seite mit einem Harz (1e) versiegelt ist, wobei äußere Verbindungsanschlüsse (1a), die mit Eingangs-/Ausgangsanschlüssen des Halbleiterchips (1b) zu verbinden sind, flach geführt werden und auf einer anderen Seite der Leiterplatte mit Durchkontaktmontage (1c) freiliegen,
und einen Schritt zum lösbaren Einsetzen oder Anordnen des plattenartigen IC-Bausteins (1) in dem Bestückungsabschnitt des kartenartigen Trägers (2), wobei die Oberfläche der äußeren Verbindungsanschlüsse (1a) des plattenartigen IC-Bausteins (1) so freiliegt, daß sie mit der Oberfläche des kartenartigen Trägers (2) im wesentlichen bündig ist, und zum elektrischen Verbinden der äußeren Anschlüsse (1a) des IC-Bausteins (1) mit den Verbindungsanschlüssen des Bestückungsabschnitts (3a).

12. Verfahren nach Anspruch 11, wobei der Schritt zum Ausbilden des kartenartigen Trägers (2) durch Bereitstellen der Struktur zum Einsetzen oder Einbau des plattenartigen IC-Bausteins (1) ferner das Einsetzen oder den Einbau eines Oszillators (2c) zur Vorgabe einer Frequenz sowie einer Stromversorgungsbatterie (2b) in die vorher festgelegten Bereiche der kartenartigen Leiterplatte (3') aufweist, und wobei das Verfahren ferner einen Schritt zum Einbau und zum Anordnen des plattenartigen IC-Bausteins (1), des Oszillators (2c) und der Stromversorgungsbatterie (2b) in den vorgegebenen Bereichen des kartenartigen Trägers (2) sowie zum elektrischen Verbinden durch die vorgegebene Schaltkreisverdrahtung innerhalb des kartenartigen Trägers (2) aufweist.

Revendications

1. Carte IC présentant à la fois des fonctions de carte avec contact et de carte sans contact, la carte comprenant:

un module IC du type plaque (1) dans lequel une puce semiconductrice (1b) comportant au moins une fonction de mémoire et une fonction de CPU est disposée sur un côté d'une carte à trous traversants (1c), la puce semiconductrice (1b) étant scellée sur un côté avec une résine (1e), des bornes de connexion externes (1a) destinées à être connectées à des bornes d'entrée/sortie de la puce semiconductrice (1b) étant élaborées et exposées à plat sur un autre côté de la carte à trous traversants (1b); et
un support en forme de carte (2) qui permet de former la carte IC avec le module IC du type plaque (1), le support en forme de carte (2) comprenant une section d'emboîtement pour emboîter de façon amovible le module IC du type plaque (1), un câblage de circuit requis et une antenne (2a) pour envoyer et recevoir un signal sans contact;

la section d'emboîtement comportant des bornes de connexion agencées en son sein pour connecter électriquement le câblage de circuit requis aux bornes de connexion externes (1a), dans laquelle le support en forme de carte (2) comporte une zone circonférentielle et une zone interne entourée par la zone circonférentielle, la section d'emboîtement étant formée dans la zone interne et l'antenne (2a) étant formée dans la zone circonférentielle de manière à entourer la zone interne pour envoyer et recevoir un signal sans contact.

2. Carte IC selon la revendication 1, comprenant en outre un moyen qui applique à ladite antenne une onde électrique présentant une longueur d'onde différente à un cadencement différent du signal pour générer de l'énergie électrique pour un fonctionnement par induction électromagnétique.

3. Carte IC selon la revendication 1 ou 2, comprenant en outre un accumulateur d'alimentation (2b) prévu dans le support en forme de carte (2).

4. Carte IC selon la revendication 1 ou 2, comprenant en outre un oscillateur (2c) pour spécifier une fréquence et un accumulateur d'alimentation (2b), l'oscillateur (2c) et l'accumulateur d'alimentation (2b) étant prévus dans la zone interne du support en forme de carte (2).

5. Carte IC selon l'une quelconque des revendications 1 à 4, dans laquelle ladite puce semiconductrice présente une fonction d'oscillation à une fréquence requise.

6. Carte IC selon l'une quelconque des revendications 1 à 5, dans laquelle la carte de câblage dudit module IC du type plaque (1) est une carte de câblage à base de résine.

7. Carte IC selon l'une quelconque des revendications 1 à 6, dans laquelle ladite carte IC présente une épaisseur de 0,76 mm.

8. Carte IC selon la revendication 1, comprenant en outre un oscillateur (2c) pour spécifier une fréquence et un accumulateur secondaire rechargeable (2b), l'oscillateur (2c) et l'accumulateur secondaire rechargeable (2b) étant prévus dans le support en forme de carte (2).

9. Carte IC selon l'une quelconque des revendications 1 à 8, dans laquelle le support en forme de carte (2) comporte une structure empilée, la structure empilée comprenant:

une première plaque mince isolante (3) comportant une fenêtre (3a) pour exposer et emboîter le côté des bornes de connexion de façon externe du type plat (1a) du module IC du type plaque (1) et une section d'emboîtement évidée pour un accumulateur d'alimentation (2b);

un corps de carte de circuit (3') comportant des sections d'emboîtement ouvertes pour le module IC du type plaque (1) et l'accumulateur d'alimentation (2b), qui est appliqué sur la première plaque mince isolante (3), et incluant l'antenne (2a) incorporée dans la partie circonférentielle du corps de carte de circuit (3') et connectée électriquement à un câblage de circuit dans le corps de carte de circuit (3'); et

une seconde plaque mince isolante (3") qui est appliquée sur l'autre côté dudit corps de carte de circuit (3').

10. Carte IC selon la revendication 9, dans laquelle ladite première plaque mince isolante (3), ledit corps de carte de circuit (3') et ladite seconde plaque mince isolante (3") présentent respectivement des épaisseurs d'environ 0,3 mm, 0,3 mm et 0,16 mm.

11. Procédé de fabrication d'une carte IC, le procédé comprenant les étapes qui suivent:

une étape de formation d'une carte de câblage en forme de carte (3') incluant un câblage de circuit requis et une antenne (2a) pour envoyer et recevoir un signal sans contact;

une étape de formation d'un support en forme de carte (2) en constituant une structure pour emboîter ou inclure un module IC du type plaque (1) dans une zone prédéterminée de la carte de câblage en forme de carte (3') afin de définir une section d'emboîtement (3a) pour le module IC (1), la section d'emboîtement comportant des bornes de connexion agencées en son sein qui sont connectées électriquement au câblage de circuit;

le module IC du type plaque comportant une puce semiconductrice (1b) présentant au moins une fonction de mémoire et une fonction de CPU disposée sur un côté d'une carte à trous traversants (1c), la puce semiconductrice (1b) étant scellée sur un côté avec une résine (1e), des bornes de connexion externes (1a) destinées à être connectées à des bornes d'entrée/sortie de la puce semiconductrice (1b) étant élaborées et exposées à plat sur un autre côté de la carte à trous traversants (1c); et

une étape d'emboîtement ou d'agencement du module IC du type plaque (1) de façon amovible dans la section d'emboîtement du support en forme de carte (2), la surface de bornes de

connexion de façon externe (1a) du module IC du type plaque (1) étant exposée de manière à être sensiblement à niveau avec la surface du support en forme de carte (2), et de connexion électrique des bornes externes (1a) du module IC (1) aux bornes de connexion de la section d'emboîtement (3a).

12. Procédé selon la revendication 11, dans lequel l'étape de formation du support en forme de carte (2) en constituant la structure pour emboîter ou inclure le module IC du type plaque (1) comprend en outre l'emboîtement ou l'inclusion d'un oscillateur (2c) pour spécifier une fréquence et d'un accumulateur d'alimentation (2b) dans les zones prédéterminées de la carte de câblage en forme de carte (3') et le procédé comprend en outre une étape d'inclusion et d'agencement du module IC du type plaque (1), de l'oscillateur (2c) et de l'accumulateur d'alimentation (2b) dans les zones prédéterminées du support en forme de carte (2), et de connexion électrique au moyen du câblage de circuit prédéterminé dans le support en forme de carte (2).

FIG. 1

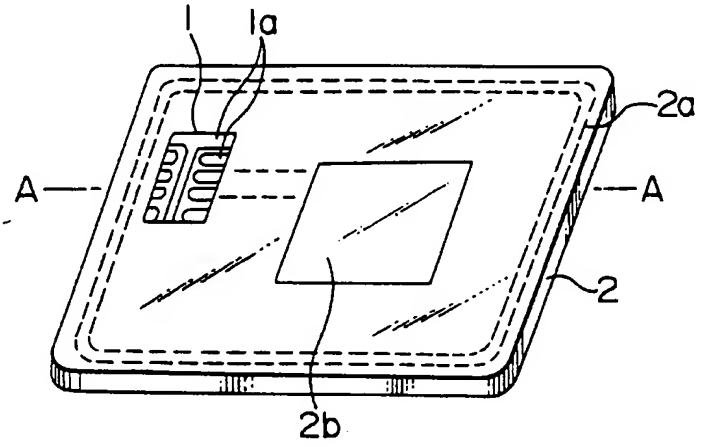

FIG. 2

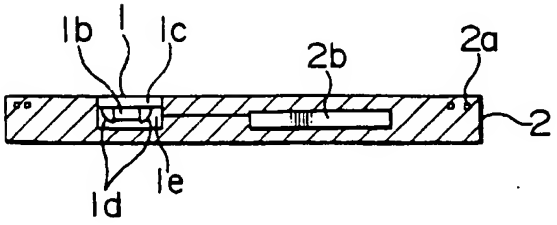

FIG. 3

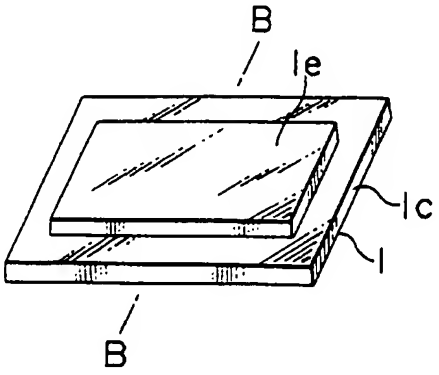

FIG. 4

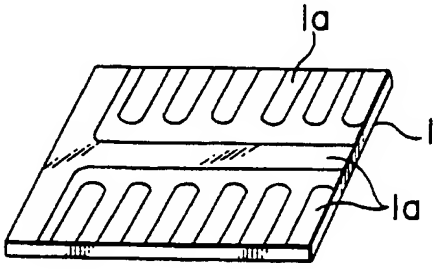

FIG. 5

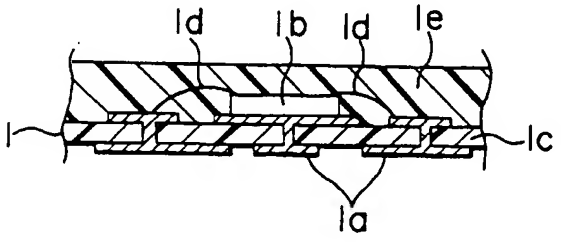

FIG. 6

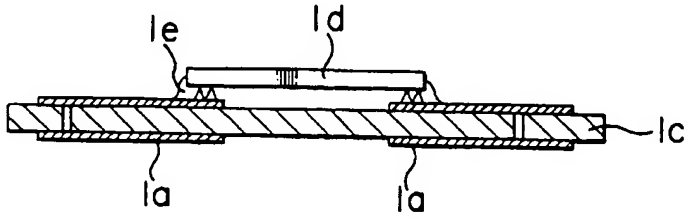

FIG. 7

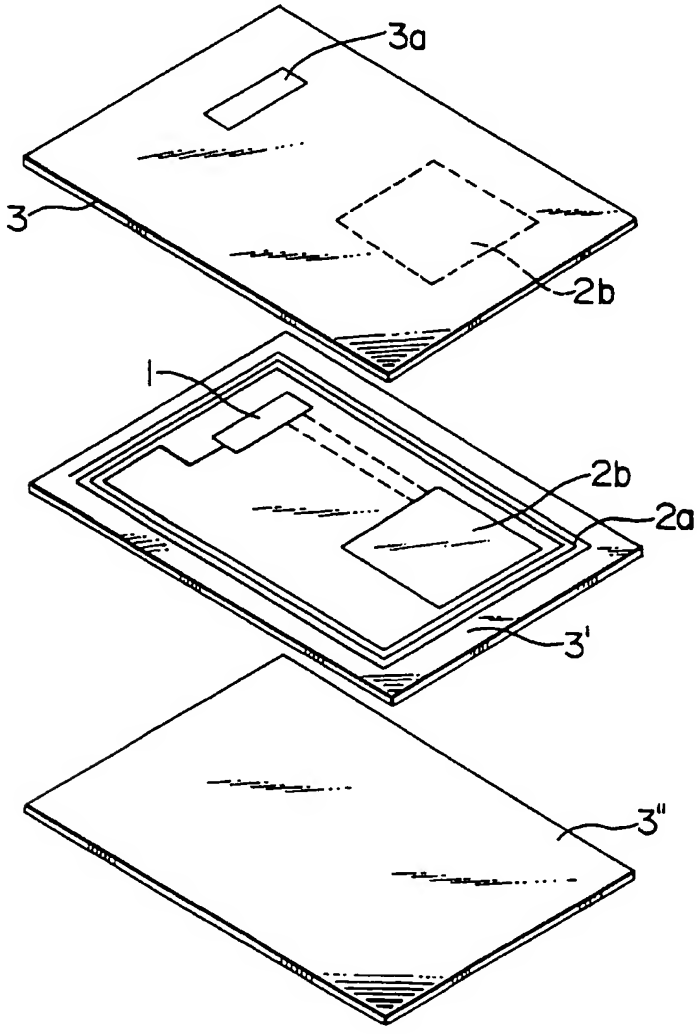

FIG. 8